

WHAT IS CLAIMED IS:

1. An integrated electrode comprising a substrate equipped with at least one electric conductor, and a wiring part which leads an electrical signal out from said electric conductor,

said integrated electrode can detect an electrical signal resulting from an electrophysiological change of a cell immobilized on the surface of said electric conductor,

wherein at least a part of the surface of said electric conductor is coated with a dielectric material,

said dielectric material is a positively charged polymer material, and

said cell is an isolated cell and/or a cultured cell.

2. The integrated electrode according to claim 1 wherein said integrated electrode is constituted such that said cell is immobilized on the surface of said electric conductor without the degeneration of the cell.

3. The integrated electrode according to claim 1 wherein said dielectric material comprises a polymer material selected from the group consisting of polyethyleneimine, polyornithine, and polylysine.

4. The integrated electrode according to claim 1 wherein said dielectric material comprises a polymer material having a biguanide group or a carbamoylguanide group.

5. The integrated electrode according to claim 1 wherein said electric conductor comprises a material which includes a material selected from the group consisting of platinum, gold, palladium, rhodium, silver, tungsten, ITO, and any

mixtures thereof.

6. The integrated electrode according to claim 1 wherein at least a part of the surface of said electric conductor coated with said dielectric material is further coated with an immobilization material,

said immobilization material is a material that provides an electrostatic interaction and/or intermolecular force with said cell, and that is different from said dielectric material.

7. The integrated electrode according to claim 6 wherein said immobilization material is a cell adhesive protein.

8. The integrated electrode according to claim 1 wherein the capacitance of the electric double layer of the interface with a 0.1 M electrolyte solution of said electric conductor is $27 \mu\text{F}/\text{cm}^2$ or greater at the applied voltage of 0 V.

9. The integrated electrode according to claim 1 wherein said electric conductor is formed within at least one through-hole formed to the substrate and/or around said through-hole on the upper face of said substrate.

10. The integrated electrode according to claim 9 wherein one said electric conductor is formed per one said through-hole.

11. The integrated electrode according to claim 9 wherein one said electric conductor is formed per a set of multiple said through-holes.

12. A cell immobilization device which is equipped with

the integrated electrode according to claim 1, and a solution retaining part for culturing said cell in a region including the surface of said electric conductor of said integrated electrode.

13. The cell immobilization device according to claim 12 wherein said integrated electrode is equipped with multiple said electric conductors, and said solution retaining part is separated per each one electric conductor.

14. The cell immobilization device according to claim 12 wherein said integrated electrode is equipped with multiple said electric conductors, and said solution retaining part is separated per a set of said multiple electric conductors.